Comparing maternal pre-pregnancy weight classification methods and the effect on gestational weight gain classification among MI adolescents, 2003-2007

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Outline

- Introduction
- Methods
- Results
- Discussion
- Public Health Significance

Introduction

- Pregnancy weight gain is an important determinate of infant & maternal outcomes[1-3]
- 1990-Institute of Medicine (IOM) developed pregnancy weight gain recommendations based on adult Body Mass Index (BMI) categories[1]
- Discordance between IOM 1990 and CDC BMI weight for age identified[5,6]
- 2007-IOM Workshop expressed concern that adult BMI categories were inappropriate for adolescents[4]
- 2009 -IOM revised pregnancy weight gain recommendations and suggest that adolescents continue to be classified by adult BMI categories[7]

Introduction

Comparison of Institute of Medicine pre-pregnant adult BMI categories and CDC BMI percentile categories (age/gender specific)

Pre-pregnancy BMI	IOM 1990	IOM 2009	CDC BMI percentile
Underweight	< 19.8	< 18.5	< 5th
Normal weight	19.8 - 26.0	18.5 – 24.9	5th - < 85th
Overweight	26.1 - 29.0	25.0 - 29.9	85th - < 95th
Obese	≥ 29.1	≥ 30.0	≥ 95th

Introduction

Institute of Medicine pregnancy weight gain recommendations based on pre-pregnancy BMI

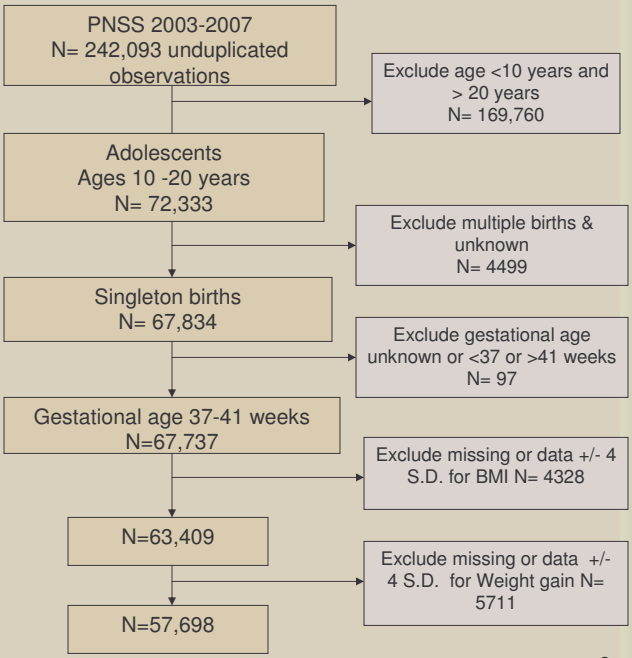
Pre-Pregnancy BMI	IOM 1990 rec. wt. gain (lbs)	IOM 2009 rec. wt. gain (lbs)
Underweight	28 - 40	28 - 40
Normal weight	25 – 35	25 - 35
Overweight	15 – 25	15 -25
Obese	At least 15	11-20

Note that the IOM 1990 did not establish an upper limit for obese women; however, the upper limit of 25 pounds was used in PNSS data analysis.

Study Questions

- Is there discordance between BMI categorization methods among pre-pregnant adolescents?
- Is discordance associated with inappropriate weight gain based on IOM 1990 and/or 2009 recommendations?

Methods



Methods

- Pre-Pregnancy BMI (kg/m^2) based on:
  - Pre-Pregnancy weight (kg)
    - Self-reported
    - Correlated with prenatal weight (measured at WIC enrollment)
      - Pearson's correlation coefficient ranged from 0.919 to 0.927 (per year)
    - Mean difference $\pm$ standard error
      - Overall ranged from 5.0 $\pm$ 0.6 to 5.5 $\pm$ 0.12 kg
      - Increased by WIC Trimester 2.0 $\pm$ 0.7 kg -1st trimester 4.4 $\pm$ 0.9 kg-2nd trimester & 11.3 $\pm$ 0.15 -3rd trimester

Methods-outcomes

- Discordance
  - BMI CDC vs. BMI 90 or BMI 09
  - Also predictor variable for 2nd study question
- Weight gain categorized as less than recommended, recommended or more than recommended based on:
  - IOM 90
  - IOM 09

Methods-independent variables

- Age
- Race/Ethnicity
- Previous pregnancy
- Pre-Pregnancy weight
  - BMI 90 –categorized based on IOM 1990 criteria
  - BMI 09 –categorized based on IOM 2009 criteria
  - BMI CDC –categorized base on the CDC age/gender specific BMI tables
- Poverty Level
- Marital Status

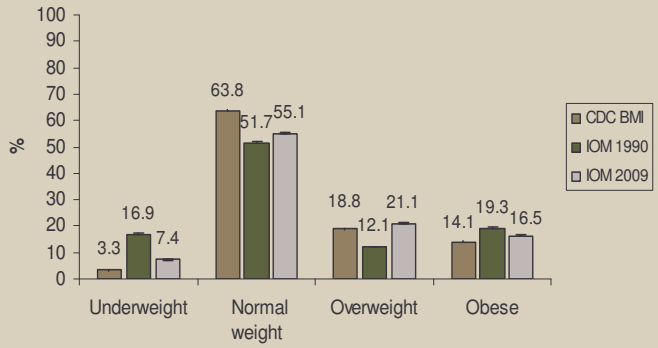
SAS 9.1 (SAS Institute Inc., Cary, NC) was used for statistical analyses

Results- Distribution of selected characteristics

Characteristics	N	%
Age (years)		
10-15	3552	5.6
16-17	14637	23.0
18-19	29500	46.6
20	15720	25.0
Race/Ethnicity		
White, non-Hispanic	35900	56.6
Black, non-Hispanic	19888	31.4
Hispanic	5887	9.3
Asian/Pacific Islander	452	0.7
American Indian/Alaska Native	275	0.4
Multi-racial, non-Hispanic	1007	1.6
All	63409	

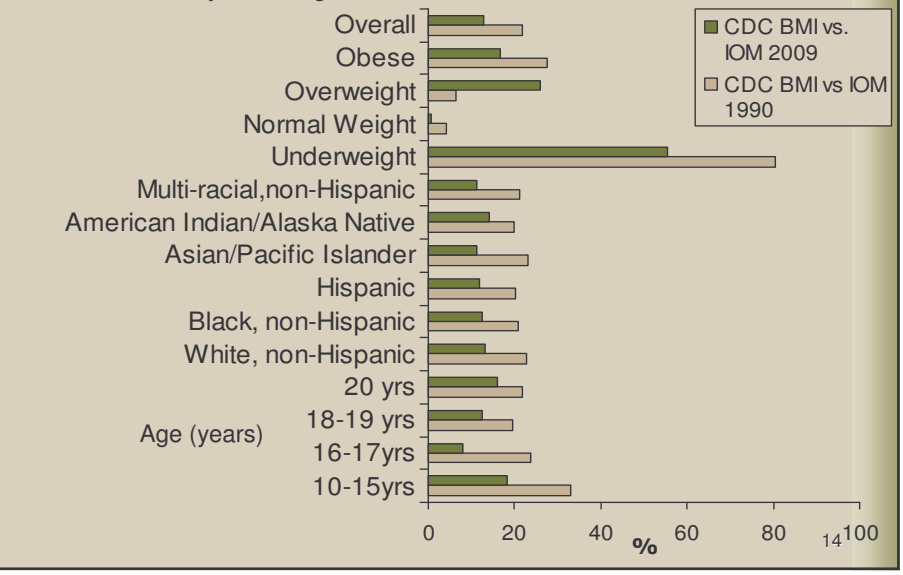
Results

Prevalence of Pre-pregnancy BMI among adolescents ages 10-20 by CDC age/gender specific categories, IOM 1990 categories and IOM 2009 categories, MI PNSS 2003-2007



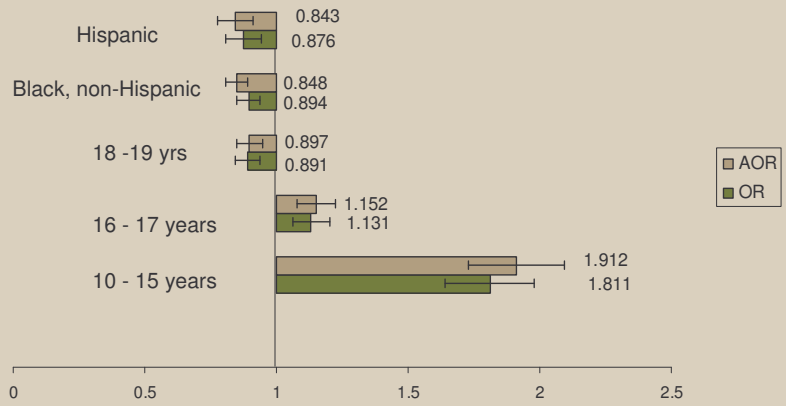
Results-Discordance

Prevalence of discordance of BMI by selected characteristics among adolescents 10-20 years of age, MI PNSS 2003-2007



Results-Logistic Regression

Adjusted and crude effects of characteristics on BMI discordance (IOM 1990)



•Adjusted for age, race/ethnicity, previous pregnancy Passed Hosmer and Lemeshow test, but c value = 0.547 Reference: White, non-Hispanic, Age 20 years

Results-Logistic Regression

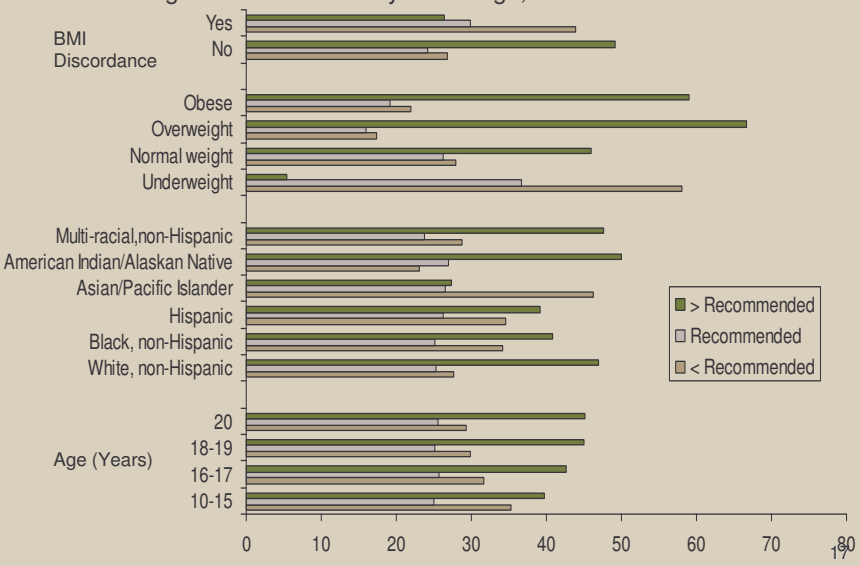
IOM 2009 OR;95% CI†

- Maternal Age
  - 10-15 years 1.155; 1.035, 1.287
  - 16-17 years 0.449; 0.413, 0.488
  - 18-19 years 0.749;0.704, 0.797

†Model includes age- all other effects eliminated by backward selection. Compared to 20 years of age

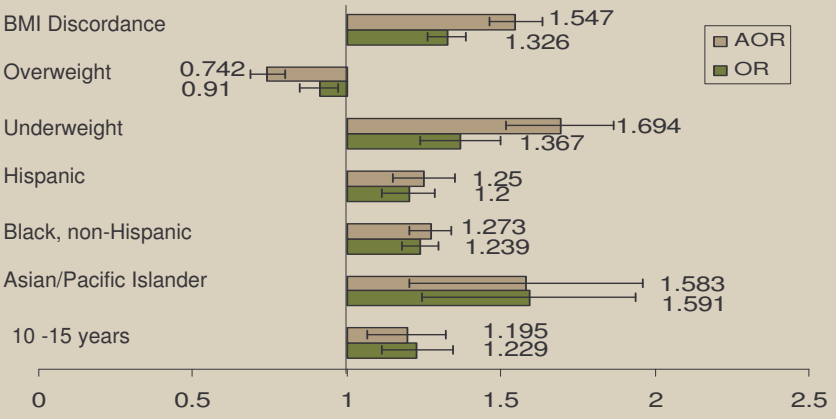
Results-Weight gain IOM 1990

Distribution of selected characteristics and weight gain based on IOM 1990 among adolescents 10-20 years of age, MI PNSS 2003-2007



Results – Multinomial Regression IOM 1990

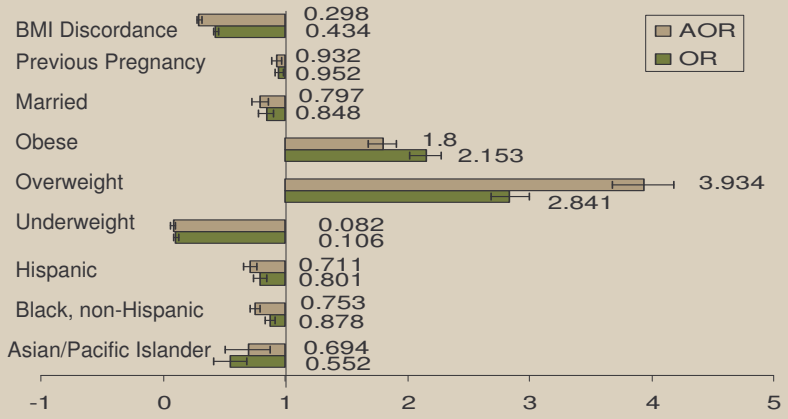
Estimated effects of demographic characteristics and BMI discordance on weight gain categorized as **less** than recommended, adolescents ages 10-20 years MI PNSS 2003-2007



Model includes maternal age, race/ethnicity, BMI (CDC), marital status, previous pregnancy and BMI discordance between IOM 1990 and CDC BMI. OR =1.0 for: No BMI Discordance, Normal weight, White, non-Hispanic, and 20 years.

Results – Multinomial Regression IOM 1990

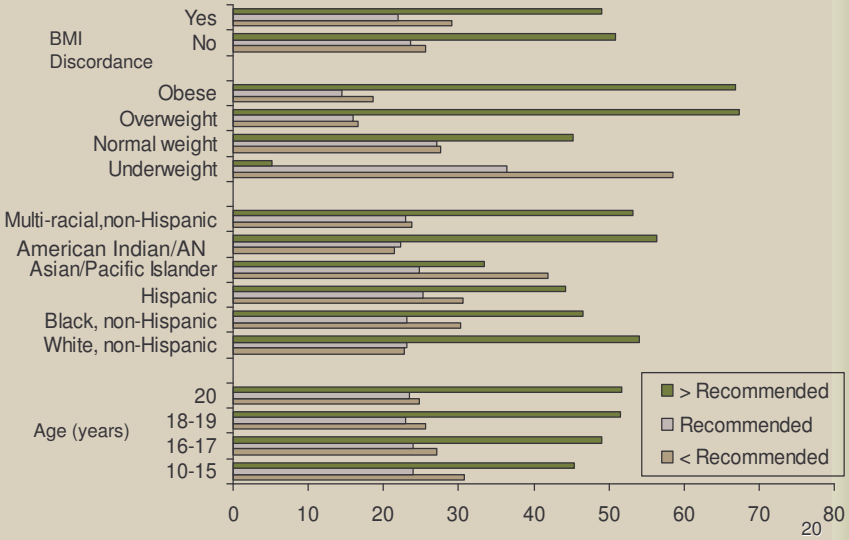
Estimated effects of demographic characteristics and BMI discordance on weight gain categorized as **more** than recommended, adolescents ages 10-20 years MI PNSS 2003-2007



Model includes maternal age, race/ethnicity, BMI (CDC), marital status, previous pregnancy and BMI discordance between IOM 1990 and CDC BMI OR =1.0 for: No BMI Discordance, No previous pregnancy, single Normal weight, White, non-Hispanic

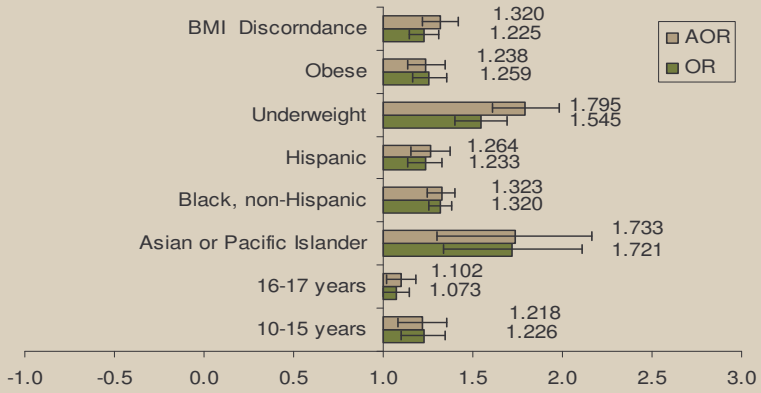
Results-Weight gain IOM 2009

Distribution of selected characteristics and weight gain based on IOM 2009 among adolescents 10-20 years of age, MI PNSS 2003-2007



Results – Multinomial Regression IOM 2009

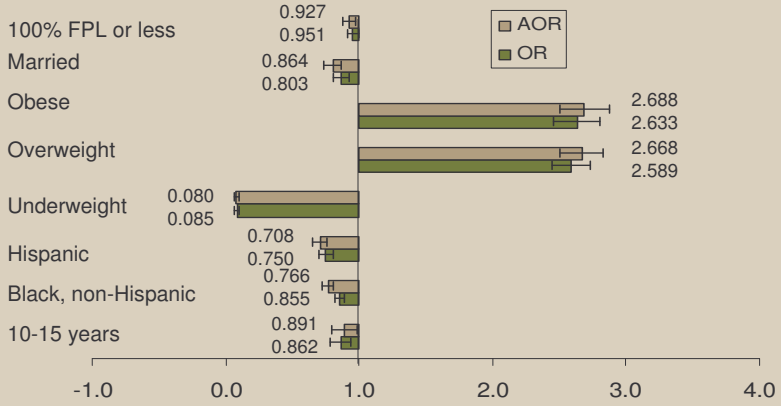
Estimated effects of demographic characteristics and BMI discordance on weight gain categorized as **less** then recommended, adolescents ages 10-20 years MI PNSS 2003-2007



Model includes maternal age, race/ethnicity, BMI (CDC), marital status, previous pregnancy, income and BMI discordance between IOM 2009 and CDC BMI. OR =1.0 for: No BMI Discordance, Normal weight, White, non-Hispanic, and 20 years.

Results – Multinomial Regression IOM 2009

Estimated effects of demographic characteristics and BMI discordance on weight gain categorized as **more** than recommended, adolescents ages 10-20 years, MI PNSS 2003-2007



Model includes maternal age, race/ethnicity, BMI (CDC), marital status, previous pregnancy, income and BMI discordance between IOM 2009 and CDC BMI. OR =1.0 for: Poverty level > 100%, single Normal weight, White, non-Hispanic and Age 20 years.

Conclusion

- Discordance between the three methods of BMI classification was found
  - Less for IOM 2009
- Discordance was associated with inappropriate weight gain based IOM recommendations
- Racial disparities were evident
- Underweight adolescents at increased odds of less than recommended weight gain

Public Health Implications

- BMI categorization based on the CDC age/gender specific percentiles for pregnant adolescents may be more appropriate.
- Gestational weight gain recommendations specifically for adolescents must be further explored and thus better understood.

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Thank you